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(54) Title: LAMINATES (57) Abstract A laminate comprises: a first layer of polymeric film material having an image deposited on a first surface thereof by an electrostatic deposition process, a second layer of optically transparent or translucent material, the first surface of the first layer being bonded to the second layer by a layer of optically transparent adhesive material, the arrangement being such that the image on the first layer can be viewed through the second layer and the layer of optically transparent adhesive material.		

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LAMINATESFIELD OF THE INVENTION

This invention relates to laminates, and more particularly laminates for use in the production of display systems and a process for the production of such laminates.

5 BACKGROUND OF THE INVENTION

Display systems of the type used, for example, in signs and placards, posters, pictures, stickers, illuminated and reflective signs, are produced by a wide variety of techniques.

10 A typical display system comprises a laminate of an optically transparent protective cover surface and a sheet of paper carrying the required information printed thereon. In general the printing process is expensive, particularly where colour printing is required, and for outdoor applications the paper

15 must be protected against ingress of water.

It is known to laminate the printed paper sheet to the optically transparent cover surface using an optically transparent adhesive, and if necessary to apply a protective

20 backing surface which may also be adhered to the paper.

Such laminates are widely used for advertising and display purposes, but because of the printing process are relatively expensive, particularly when only small numbers of prints are

25 required.

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Attempts have been made to produce laminates for advertising and display purposes by the use of heat transfer processes, but these are also relatively expensive and of limited application. Photographic processes have also been
5 used, but only to a limited extent again because of the high costs involved.

Further difficulties have been introduced by prior art lamination processes which often require elevated temperatures
10 and specialised lamination equipment unsuitable for single jobs or small customised runs.

There is therefore a need for a laminate comprising a protective optically transparent cover surface and a sheet
15 carrying information to be displayed, which is both versatile and can be inexpensively produced in small or large quantities on relatively inexpensive equipment.

BRIEF DESCRIPTION OF THE INVENTION

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In the present invention there is provided a laminate, suitable for use as a display system, which comprises a polymeric film material having an image electrostatically deposited thereon, and a process for the production of such a
25 laminate.

According to one aspect of the present invention there is provided a laminate comprising:

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a first layer of polymeric film material having an image deposited thereon by an electrostatic deposition process,

a second layer of optically transparent or translucent material,

5 the first layer being bonded to the second layer by a layer of optically transparent adhesive material,

the arrangement being such that the image on the first layer can be viewed through the second layer and the layer of optically transparent adhesive material.

10

In a second aspect the invention further provides a method of making a laminate which comprises:

depositing an image on a first layer of polymeric film material by an electrostatic deposition process, and

15 bonding a second layer of optically transparent or translucent material to the first layer using an optically transparent adhesive material,

such that the image on the first layer can be viewed through the second layer and the optically transparent adhesive
20 material.

In a further aspect the invention provides a method of making an adhesive laminate which comprises:

depositing an image on a first surface of the first layer
25 of polymeric film material by an electrostatic deposition process,

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removing adhesion inhibiting materials associated with the electrostatic deposition process from the film material surface whilst leaving the image undisturbed, and

applying a layer of optically transparent adhesive material to the first surface film material carrying the deposited image.

DETAILED DESCRIPTION OF THE INVENTION

10 The first layer of polymeric film material preferably comprises a biaxially orientated polymeric film which may be formed from any suitable polymeric material such as, for example, a polyester, for example a polyacrylate, and more particularly a polyethylene terephthalate; or a methyl
15 methacrylate or ethyl methacrylate polymer or copolymer; an olefin polymer, copolymer or block copolymer, for example polymers, copolymers and block copolymers of ethylene, propylene, butylene and other olefins with, if desired, other vinyl monomers; a polycarbonate; a polyethersulphone; a
20 polyether ether ketone; or a polyurethane. A preferred polymer is polyethylene terephthalate and a suitable polyethylene terephthalate biaxially orientated film is produced by ICI under the trade mark Melinex, of which the particular grades preferred for use in the present invention are Melinex 542 and
25 Melinex 054. These grades are pre-treated to improve the adhesion thereto by print and lacquer. Melinex S is also suitable, but this is an untreated grade which may need to be treated to improve its image adhesion characteristics. The

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treatment may, for example, comprise coating with an organic polymer layer having improved image adhesion characteristics. Typical coatings which may be applied to a base film material to improve image adhesion are acrylic or cellulosic materials, 5 which may also desirably contain a slip agent.

It is important that the first layer of polymeric film material should be thermally and dimensionally stable under the conditions used in electrostatic deposition processes. For 10 example the temperature of an electrostatic copier roller is normally greater than 150°C, and can be from 160°C to 190°C. Although the first layer of polymeric film material is exposed to the heat of the roller for only a short time, it can become degraded, twisted and buckled, or even melt, if a polymer of 15 too low a thermal and dimensional stability is chosen. Acetate films, for example, are not normally suitable for this reason. In general, the first layer of polymeric film material should be capable of withstanding a temperature of at least 150°C and preferably at least 190°C without substantial instantaneous 20 degradation, structural change, dimensional change, or colour change. Most preferably the film material should be such that it is thermally and dimensionally stable when exposed to a temperature of 200°C for at least 0.5 seconds.

25 The above preferred grades of film are normally transparent, but for many purposes an opaque, and especially a white opaque, film is preferred. Such white opaque films can be produced by applying to the polymeric film a coating layer

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comprising a filler such as silica or titanium dioxide dispersed in a suitable binder. Suitable white opaque coated polymeric films are produced by Imperial Graphic Products plc, Celfa AG, Renka, 3M and Image Data (division of ICI). These
5 companies also produce films in colours other than white for example by applying to the film coating layers comprising suitable colourants. These films may also be used in the present invention.

10 Even where an opaque grade of polymeric film is used, for example because an opaque filler has been included during manufacture, the film will usually still require a surface coating for image adhesion purposes, as previously discussed.

15 Although the invention will subsequently be described with reference to the use of polyester films, it is to be understood that it is not limited thereto, and any other suitable polymeric film having the appropriate surface characteristics and stability for electrostatic copying can also be used.

20

The image is deposited on the first polymeric film layer by an electrostatic and particularly a xerographic process, preferably by passing the polymeric film layer through a xerographic photocopier, especially a colour photocopier. Any
25 suitable colour photocopier can be used in the process of the present invention, for example a laser copier, digital copier or the like and the invention is not limited to any particular colour photocopying method or electrostatic technique for the

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production of the deposited image. Good results have been achieved using a Xerox model 5775 and Canon CLC, and these are the preferred machines, although other machines, using other electrostatic deposition techniques, may also be suitable.

5

Xerographic processes deposit the image onto the film as a powder or toner layer which is subsequently fixed by heating and treatment with a stabilizer containing a silicone material, for example a silicone oil.

10

I have discovered that the silicone-containing stabilizer remains on the surface of the xerographic electrostatically deposited image and inhibits adhesion to the polymeric film surface, such that conventional adhesives, particularly those that are active at ambient or relatively low elevated temperatures, cannot be used to form a laminate.

I have now discovered, surprisingly, that the silicone containing stabilizer material can be removed from the film sufficiently to obtain a substantial improvement in adhesion by gentle washing or wiping with a cleaning liquid or solution without harming the image, and this is an important aspect of the method of the present invention. Clearly such a process could not be applied to normal xerographic paper, because it would soon absorb the cleaning liquid or solution and ultimately disintegrate, but it has been found that washing or wiping the film in accordance with the process of the invention enables the undesirable adhesion-inhibiting components of the

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xerographic image surface to be removed whilst leaving the image itself substantially unaffected.

In general any aqueous or non-aqueous liquid or solution capable of removing the adhesion-inhibiting materials from the film surface can be used, provided that the xerographic image is not disturbed and the film is not discoloured or degraded, but it is convenient and preferred to use an aqueous soap or detergent solution. In one method of carrying out this process of the invention, the film carrying the deposited image can be dipped or immersed in a bath of the cleaning liquid or solution, which can, for example, comprise a detergent solution containing several drops of a commercial liquid detergent such as Fairy Liquid or Sunlight Liquid per litre of water. The process can be carried out at ambient temperature, at a temperature that is "hand warm" or at any temperature that will not affect the film or the image, for example up to about 60°C or even more. More concentrated detergent solutions can also be used but this is not normally necessary.

20

For applications where the use of a washing process is inconvenient, for example if the method of the invention is to be used in areas with limited working space, the adhesion-inhibiting materials can still be removed to a satisfactory extent by the application of a suitable cleaning liquid or solution which can, for example, be an aqueous or non-aqueous solution containing a detergent or some other chemical compound capable of removing oily or silicone deposits from the surface

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of the deposited image. The solution can, for example, be applied as a spray. Such a spray can, for example, be hand-held, and may have a hand pump trigger action. Suitable liquids and solutions are those that do not scratch or damage the surface of the image, are smear-free and stain-free, are non-toxic, and do not give off unpleasant or hazardous vapours and fumes.

The spray solution can, for example, be a solution of a detergent in a mixture of water and a suitable organic solvent, which may be, for example, an alcohol such as isopropyl alcohol, or an ether such as ethyl glycol mono butyl ether (also known as EGB). A variety of commercially available cleaning liquids and solutions can be used, but it is important that any liquid or solution should first be subjected to a trial to ensure that it does not contain any components likely to damage the image or the film.

A fine spray of the solution can be directed onto the surface of the image and the liquid then wiped away and the surface thoroughly dried using a clean, soft, lint free cloth. It is found that, with suitable treatment, which may be repeated if necessary, the deposits of adhesion-inhibiting materials may be satisfactorily removed.

25

It is also possible, with suitable cleaning liquids and solutions, to apply a few drops of the liquid or solution to

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a damp cloth and use this to wipe away the adhesion-inhibiting materials from the surface of the deposited image.

The second layer of optically transparent or translucent material comprises the protective cover surface for the image, and may comprise a biaxially orientated sheet or film of a suitable polymeric material, for example a polyester, an acrylic polymer, a polyethylene terephthalate, or polycarbonate or similar material. The invention is not, however, limited to such materials, and other transparent or translucent sheet materials such as glass may also be used in certain applications. The sheet can be rigid or flexible depending on the application, and may be of any desired thickness. Where the second layer is translucent, that is to say not optically clear, the light transmission must still be sufficient for the image to be viewed through it, if necessary with illumination from the back of the laminate.

The optically transparent adhesive material should be capable of forming a permanent bond, and of adhering without leaving bubbles (pockets of air) in the laminate. It should of course be capable of adhering to the xerographic image comprising the toner used in the xerographic process. Suitable adhesives include acrylic-based resins such as methyl methacrylate and ethyl methacrylate, synthetic rubber-based adhesives, ethylene-propylene copolymers, propylene polymers, and ionomer resins and suitable grades are made by several manufacturers. Particularly good results have been obtained

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using an adhesive supplied as a film, which may have a protective overlay on one or both surfaces. Such adhesives are sold, for example, by Mactac under the trade marks Macbond (acrylic and rubber-based adhesives), Macmount (acrylic and rubber-based adhesives), and Macfilm (acrylic adhesives), all of which may be provided with protective overlays of polymeric film or paper. Good results have been obtained using Mactac UV protective acrylic adhesive reference No. F2010.

10 Curing acrylic films such as Mactac are preferred for certain applications because they permit the possibility of repositioning the components of the laminate within a few minutes of application, for example if the components have not been lined up correctly.

15

The adhesive is preferably one that will achieve a satisfactory bonding at ambient temperatures, that is to say room temperature, or at only slightly elevated temperatures, for example below about 60° C.

20

Some protective cover films are supplied ready-coated with adhesive, for example Mactac, 100 μ vinyl polymer film with Macal 8199 acrylic adhesive, Mactac PG7036, 36 μ and Mactac 7075, 75 μ , polyester polymer films with acrylic adhesive, and 25 PF-6000, a 420 μ matt finish translucent polycarbonate film coated with adhesive.

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The components of the laminate may be assembled by any suitable method, and in any order. In one preferred method the optically transparent adhesive material is applied to the second layer of optically transparent or translucent material in a first stage, and then the adhesive coated optically transparent or translucent material laminated to the polymeric film material carrying the image in the second stage. If the polymeric film material carrying the image is to have a backing applied thereto, this is preferably applied to the polymeric film material first, to avoid the possibility of the laminate curling. Lamination can be achieved by passing the materials through a pair of laminating rollers, or by any other convenient process. Suitable laminating rollers are produced by Sallmetall BV.

15

The laminates of the invention may be provided with a wide variety of backing surfaces, either for protection, or for adhering to a substrate, or to achieve special effects. For example, the laminate may be adhered to a substrate such as a metal, plastic, cardboard or woodblock backing sheet layer by the use of a double-sided adhesive film such as, for example, Stera-Tape. Preferably the double-sided adhesive film is provided with a protective overlay, whereby it is possible to produce self-adhesive stickers using the laminates of the present invention. Many other types of acrylic or rubber-based adhesive can of course be used for this application, and of course the adhesive may be applied as a coating from a solvent based system, or by any other convenient means. Good results

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have, however, been obtained using Sera-Tape 4051 cross linked acrylic adhesive; Sera-Tape 1091 modified acrylic adhesive and Sera-Tape 4151 modified acrylic adhesive; and Sera-Tape rubber adhesives 4471 and 3471. In some cases it is possible to
5 obtain the backing sheet with the adhesive already adhered thereto and ready for use once its protective overlay is removed. In such cases a preferred lamination method comprises first depositing the image on a first surface of the film, then laminating a second surface of the film to the backing sheet,
10 removing the adhesion inhibiting materials from the film surface, and finally laminating the second layer of optically transparent or translucent material to the first surface of the film.

15 An important use of the present invention is in the production of illuminated and reflective signs. In the case of illuminated signs, the first layer of polymeric film material may be a transparent or translucent material, such that the image is illuminated when a light is positioned behind
20 the laminate, and the image can thus be viewed through the second layer of optically transparent material. In an alternative construction, the image is deposited on a first layer of transparent polymeric film material and this is laminated to a protective cover sheet and/or a backing sheet
25 of translucent material through which the image can be illuminated.

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Reflective signs can be produced by depositing the image on a first layer of transparent polymeric film material and providing a backing layer of a reflective material. Suitable reflective film materials for use as the reflective backing layer are produced by Mactac under the trade marks Macmark and Maclite 1010, by 3M under the name 3M Reflective, by Ciba-Geigy under the trade mark Cibalite, and by other manufacturers.

Other types of backing which may be used include magnetic sheet materials which can be used to attach the laminate to metallic iron or steel surfaces, for example to form a magnetic sign or display.

The deposited image may be a composite produced by a combination of different processes. For example characters or letters may be applied by pressure transfer, such as by the Letraset technique, or alternatively a black xerographic image may be produced on a transparent film and a metallic coating applied thereto using a heat transfer foil and passing the foil and film through a heated roller. This transfers the metallic material from the foil to the black areas of the xerographic image. This film can then be laminated, together with a film carrying a colour image, between protective surface and backing sheets, so that when viewed the metallic image, characters or letters stand out in front of the colour image (which may for example be a picture).

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Compositions can be made using a computer screen, and transmitted to a xerographic colour copier using the appropriate software to produce the desired image.

5 An important advantage of the process of the present invention is that by the appropriate selection of materials the entire process can be carried out at room temperature with the use of very simple equipment.

10 Using the laminates and the process of the present invention, a wide variety of display systems, decorative and artistic pictures and designs can be quickly and economically manufactured in large or small numbers. Even individual items such as estate agents boards and other advertising signs can
15 be readily produced. The invention may also be applied to produce decorative laminated articles and decorative laminates, and may also be used to replace photographic enlargements and reduce the usage of silver in the photo printing industry. Lampshades and other diffuser lights and displays can readily
20 be produced.

The invention can also be used to produce signs adapted to adhere to, and be viewed through, glass such as shop windows and the like. For example the optically transparent material
25 comprising the protective cover surface for the image may itself have a surface which can adhere to a glass surface when pressed thereon. Alternatively, the protective cover surface in the laminate can comprise a release layer which can be

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removed to reveal the adhesive layer below. This can then be applied to the glass surface so that the glass surface becomes the protective cover surface for the laminate.

5 The invention is illustrated by the following Examples:

EXAMPLE 1

10 This Example describes the production of a laminate according to the invention.

An opaque sheet of coated biaxially oriented polyethylene terephthalate Melinex film having good toner acceptance is placed in a Canon colour photocopier and an image
15 xerographically deposited thereon. The film is then washed in a warm aqueous solution of detergent. The film is dried with a soft lint-free cloth.

The film is then placed face down on a clean surface, the
20 protective overlay is removed from one side of a film of Sera-Tape 4051 cross-linked acrylic adhesive and the adhesive surface applied to the back of the film. The remaining protective carrier layer of the adhesive film is left in place.

25 A sheet of clear acrylic plastic is provided with a layer of Mactac UV F2010 acrylic adhesive by removing one of the protective overlays from the adhesive and pressing the surfaces together.

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The adhesive-backed Melinex film is laid face up on a table and an edge of the acrylic sheet applied thereto with 2.5 cms of the adhesive on the sheet exposed at the contact edge region. The laminate is then passed through a pair of
5 laminating rollers, spaced so as to apply gentle pressure to the laminate, gently removing the protective overlay between the acrylic sheet adhesive and the film carrying the image as the laminate passes into and through the rollers. Surplus film is trimmed with a sharp knife.

10

There is produced a laminate having a self-adhesive backing useful for many display purposes. The laminate can be applied to a substrate by passing the substrate, together with the laminate, through a pair of laminating rollers and removing
15 the protective overlay on the self-adhesive backing as the laminate passes through the rollers. In this way signs having aluminium or plastic backing, or a magnetic sheet backing may be produced.

20 EXAMPLE 2

The process of example 1 is repeated except that the image is xerographically deposited on clear transparent coated plastic film. When the laminate has been produced the
25 protective overlay is removed from the backing adhesive and the laminate is applied to a reflective material having a foil backing, thereby producing a reflective sign.

EXAMPLE 3

The process of example 1 is repeated except that there is interposed between the polymeric film carrying the image and the transparent protective surface layer a further transparent coated film layer. The further layer is passed through a black and white photocopier to deposit a black image thereon and is then passed through a pair of heated rollers together with a metallic heat transfer material, to transfer the metallic material to the black portions of the image. The transparent film carrying the metallic image is then sandwiched between the transparent protective surface and the film carrying the xerographic colour image and laminated with further layers of optically clear adhesive. In this way metallic lettering or other characters can be viewed together with the colour image to achieve special effects.

EXAMPLE 4

The process of Example 1 is repeated except that the image is again produced on a clear transparent coated plastic film. When used with a reflective backing such as Maclite 1010, Cibalite or 3M Reflective, this can produce a sign having all reflective colours except black.

EXAMPLE 5

The process of Example 2 is repeated except that the reflective material is replaced with a translucent backing material. The resultant laminate can be illuminated from behind (backlit) to produce an illuminated sign or display.

EXAMPLE 6

10 The process of Example 1 is repeated except that the washing step is omitted and the adhesion-inhibiting silicone materials are removed from the image by wiping with a damp cloth to which a few drops of Fairy Liquid detergent have been applied. The film is then dried and treated as before to form
15 a laminate.

The reader's attention is directed to all papers and documents which are filed concurrently with this specification and which are open to public inspection with this
20 specification, and the contents of all such papers and documents are incorporated herein by reference.

All the features disclosed in this specification (including any accompanying claims, abstract and drawings),
25 and/or all of the steps or any method or process so disclosed, may be combined in any combination, except combinations where at least some of such features and/or steps are mutually exclusive.

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Each feature disclosed in this specification (including any accompanying claims, abstract and drawings), may be replaced by alternative features serving the same, equivalent or similar purpose, unless expressly stated otherwise. Thus, 5 unless expressly stated otherwise, each feature disclosed is one example only of a generic series of equivalent or similar features.

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CLAIMS

- 1 A laminate comprising:
 - 5 a first layer of polymeric film material having an image deposited on a first surface thereof by an electrostatic deposition process,
 - a second layer of optically transparent or translucent material, a first surface of the first layer being bonded to the second layer by a layer of optically transparent adhesive material,
 - 10 the arrangement being such that the image on the first layer can be viewed through the second layer and the layer of optically transparent adhesive material.
- 2 A laminate according to Claim 1, in which the first layer of polymeric film material comprises a polyester.
- 15 3 A laminate according to Claim 1 or 2, in which the first layer of polymeric film material is treated to improve its image adhesion characteristics.
- 4 A laminate according to any of the preceding Claims, in which the first layer of polymeric film material is transparent.
- 20 5 A laminate according to any of the preceding Claims, in which the first layer of polymeric film material is opaque or has an opaque coating applied thereto.
- 25 6 A laminate according to any of the preceding Claims, in which the first layer of polymeric film material is capable of withstanding a temperature of at least 150°C

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without substantial instantaneous degradation, structural change, dimensional change, or colour change.

- 7 A laminate according to any of the preceding Claims, in which the image has been deposited by a xerographic process.
- 8 A laminate according to Claim 6, in which the image has been deposited by a xerographic colour photocopier.
- 9 A laminate according to any of the preceding Claims, in which the image is substantially devoid of adhesion-inhibiting silicone materials.
- 10 A laminate according to any of the preceding Claims, in which the second layer of optically transparent or translucent material comprises a polyester, an acrylic polymer, a polyethylene terephthalate, or a polycarbonate.
- 11 A laminate according to any of the preceding Claims, in which the optically transparent adhesive material comprises an acrylic-based resin adhesive, a synthetic rubber-based adhesive, an ethylene-propylene copolymer, a propylene polymer, or an ionomer resin-based adhesive.
- 12 A laminate according to any of the preceding Claims, in which the adhesive is one capable of bonding at ambient temperatures.
- 13 A laminate according to any of the preceding Claims, that is provided with a backing sheet adhered thereto.
- 14 A laminate according to Claim 13, wherein the backing sheet comprises a metal, cardboard, plastic or woodblock layer.

- 15 A laminate according to Claim 13, which comprises a first layer of transparent polymeric film material on which the image is deposited, the first layer being laminated to a protective cover sheet and/or a backing sheet of translucent material.
- 5 16 A laminate according to Claim 13 or 14, in which the image is deposited on a first layer of transparent polymeric film material and the backing sheet comprises a layer of a reflective material.
- 10 17 A laminate according to any of Claims 13 to 16, in which the backing sheet comprises a magnetic sheet material.
- 18 A laminate according to any of the preceding claims, in which the deposited image is a composite comprising an image produced by electrostatic deposition and an image produced by a different process.
- 15 19 A laminate according to Claim 18, in which the different process is pressure transfer or heat transfer.
- 20 20 A laminate according to any of the preceding claims, which comprises a display system, a decorative or artistic picture or design, an advertising sign or display, a lampshade or diffuser light, an illuminated or reflective sign, or a magnetic sign.
- 25 21 A laminate according to any of the preceding claims, in which the second layer of optically transparent or translucent material has a surface which can adhere to glass.
- 22 A laminate according to any of the preceding claims substantially as hereinbefore described.

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23 A method of making a laminate which comprises:

depositing an image on a first surface of a first layer of polymeric film material by an electrostatic deposition process, and

5 bonding a second layer of optically transparent or translucent material to the first surface of the first layer using an optically transparent adhesive material, such that the image on the first layer can be viewed through the second layer and the optically transparent adhesive material.

10

24 A method according to Claim 23, in which the image is deposited by a xerographic process.

25 A method according to Claim 24, in which the image is deposited by a xerographic colour photocopier.

15 26 A method according to any of Claims 23 to 25, which comprises removing adhesion inhibiting materials associated with the electrostatic deposition process from the film material surface whilst leaving the image undisturbed, prior to bonding.

20 27 A method according to Claim 26, which comprises washing or wiping the film with a cleaning liquid or solution.

28 A method according to Claim 27, in which the cleaning liquid or solution comprises an aqueous or non-aqueous detergent solution.

25 29 A method according to Claim 27 or 28, in which the film is dipped or immersed in a bath of the liquid or solution, or the film is sprayed with the liquid or solution.

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- 30 A method according to any of Claims 23 to 29, in which the optically transparent adhesive material is in the form of an adhesive film, optionally with a protective overlay on one or both surfaces.
- 5 31 A method according to Claim 30, in which the adhesive film is a curing acrylic film.
- 32 A method according to any of Claims 23 to 31, that is carried out at ambient temperature.
- 10 33 A method according to any of Claims 23 to 32, in which the optically transparent adhesive material is applied to the second layer of optically transparent or translucent material in a first stage, and the adhesive coated optically transparent or translucent material laminated to the first surface of the polymeric film material carrying the image in a second stage.
- 15 34 A method according to any of Claims 23 to 33, in which the polymeric film material carrying the image has a backing applied thereto.
- 20 35 A method according to Claim 34, in which the backing is applied by means of a double-sided adhesive film.
- 36 A method according to any of Claims 23 to 35, in which the image is deposited in a composite process comprising electrostatic deposition and a further process.
- 25 37 A method according to Claim 36, in which the further process is pressure transfer or heat transfer.
- 38 A method according to any of Claims 23 to 37, in which there are used a first layer according to any of Claims 2 to 6, a second layer according to Claim 10, an adhesive

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material according to Claims 11 or 12, and/or a backing sheet according to Claim 14.

39 A method of making an adhesive laminate which comprises:

5 depositing an image on a first surface of a first layer of polymeric film material by an electrostatic deposition process,

10 removing adhesion inhibiting materials associated with the electrostatic deposition process from the film material surface whilst leaving the image undisturbed, and

applying a layer of optically transparent adhesive material to the first surface of the film material carrying the deposited image.

15 40 A method according to Claim 39, having any of the features of Claims 23 to 38.

41 A method according to any of Claims 23 to 40, substantially as described in the Examples.

42 A laminate according to any of Claims 1 to 22, produced by a method according to any of Claims 23 to 40.

20 43 A method for the production of a laminate substantially as hereinbefore described.

INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 93/00883

I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all)⁶

According to International Patent Classification (IPC) or to both National Classification and IPC

Int.Cl. 5 B32B27/08; G03G8/00; B41M7/02; G03C11/08

II. FIELDS SEARCHEDMinimum Documentation Searched⁷

Classification System

Classification Symbols

Int.Cl. 5

B32B ;
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Documentation Searched other than Minimum Documentation
to the Extent that such Documents are Included in the Fields Searched⁸**III. DOCUMENTS CONSIDERED TO BE RELEVANT⁹**

Category ¹⁰	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
Y	EP,A,0 159 854 (M. P. DYASON) 30 October 1985 see claim 1 see page 5, line 19 - page 9, line 10 ---	1,2,4,5, 7,10,13, 14,20, 23,24
Y	WO,A,9 012 694 (COMMONWEALTH OF AUSTRALIA) 1 November 1990 see page 4, line 1 - line 18 see page 5, line 24 - line 28 see page 7, line 10 - line 22; figure 1 --- -/--	1,2,4,5, 7,10,13, 14,20, 23,24

¹⁰ Special categories of cited documents:^{"A"} document defining the general state of the art which is not considered to be of particular relevance^{"E"} earlier document but published on or after the international filing date^{"L"} document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)^{"O"} document referring to an oral disclosure, use, exhibition or other means^{"P"} document published prior to the international filing date but later than the priority date claimed^{"T"} later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention^{"X"} document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step^{"Y"} document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.^{"&"} document member of the same patent family**IV. CERTIFICATION**

Date of the Actual Completion of the International Search

06 AUGUST 1993

Date of Mailing of this International Search Report

1 8. 08. 93

International Searching Authority

EUROPEAN PATENT OFFICE

Signature of Authorized Officer

MCCONNELL C.H.

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)		
Category *	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.
A	US,A,4 048 736 (H. H. CASTLEMAN ET AL.) 20 September 1977 see claim 1 see column 4, line 65 - column 5, line 45 see column 5, line 60 - line 68 ---	1,3-6, 13-15
A	EP,A,0 195 234 (ARAKAWA, SHINICHIRO) 24 September 1986 see claims 1,4 see page 6, line 4 - page 8, line 10 ---	1,13,14, 16,20
A	EP,A,0 479 295 (DAI NIPPON PRINTING CO. LTD.) 8 April 1992 see claims 1-4 ---	1,10
A	US,A,4 387 129 (K. D. VINCENT) 7 June 1983 see column 1, line 51 - line 62 see abstract ---	1,2,4,10
A	GB,A,2 119 310 (DARYL INDUSTRIES LTD.) 16 November 1983 see the whole document ---	39
P,A	US,A,5 126 797 (P. H. FOREST ET AL.) 30 June 1992 see the whole document ---	1,6-8
A	US,A,4 378 392 (J. M. SEGEL) 29 March 1983 -----	

**ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO.**

GB 9300883
SA 73155

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.
The members are as contained in the European Patent Office EDP file on
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06/08/93

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP-A-0159854	30-10-85	JP-A- 60247636 US-A- 4619876	07-12-85 28-10-86
WO-A-9012694	01-11-90	AU-B- 611340 AU-A- 5395890 EP-A- 0470131	06-06-91 08-11-90 12-02-92
US-A-4048736	20-09-77	None	
EP-A-0195234	24-09-86	JP-A- 61215100 US-A- 4716672	24-09-86 05-01-88
EP-A-0479295	08-04-92	JP-A- 4142986	15-05-92
US-A-4387129	07-06-83	None	
GB-A-2119310	16-11-83	AU-A- 1014383 EP-A- 0107664 WO-A- 8303800 JP-T- 59500660	21-11-83 09-05-84 10-11-83 19-04-84
US-A-5126797	30-06-92	None	
US-A-4378392	29-03-83	None	

EPO FORM P079

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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